Listing of Claims:

1-89.   (Canceled)

90.   (Previously presented) A diverse population of labels, comprising thirty or more unique labels, wherein each of said unique labels comprises a molecule, said molecule comprising a plurality of genedigits, each genedigit being of predetermined sequence, wherein at least two of said genedigits are each attached to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer, and wherein said population is in solution.

91.   (Previously presented) A diverse population of labels, comprising thirty or more unique labels, wherein each of said unique labels comprises a molecule, said molecule comprising (i) a plurality of genedigits, each genedigit being of predetermined sequence, wherein at least two of said genedigits are each attached to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer, and (ii) a target-specific nucleotide sequence, said target-specific nucleotide sequence being noncovalently attached to an unlabeled target molecule.

92.   (Previously presented) A diverse population of labels, comprising thirty or more unique labels, wherein each of said unique labels comprises a molecule, said molecule comprising a plurality of genedigits, each genedigit being of predetermined sequence, each said anti-genedigit being attached to at least one label monomer, wherein each said molecule and each said anti-genedigit is a nucleic acid and each said molecule is noncovalently attached to an unlabeled bridging nucleic acid.

93.   (Previously presented) A diverse population of labels, comprising thirty or more unique labels, wherein each of said unique labels comprises a synthetic nucleic acid molecule, said synthetic nucleic acid molecule comprising (i) a plurality of genedigits, each genedigit being of predetermined sequence, wherein at least two of said genedigits are each attached to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer, and (ii) a target-specific nucleotide sequence.

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94.   (Previously presented) A diverse population of labels, comprising thirty or more unique labels, wherein each of said unique labels comprises a molecule, said molecule comprising a plurality of genedigits, each genedigit being a DNA of predetermined sequence, wherein at least two of said genedigits are each attached to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer.

95.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule further comprises a target-specific nucleotide sequence, said target-specific nucleotide sequence being noncovalently attached to an unlabeled target molecule.

96.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each said molecule and each said anti-genedigit is a nucleic acid and each said molecule is noncovalently attached to an unlabeled bridging nucleic acid.

97.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is a synthetic nucleic acid molecule which further comprises a target-specific nucleotide sequence.

98.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each genedigit is a DNA.

99.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each said molecule and each said anti-genedigit is a nucleic acid and each said molecule is noncovalently attached to an unlabeled bridging nucleic acid.

100.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is a synthetic nucleic acid molecule which further comprises a target-specific nucleotide sequence.

101.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each genedigit is a DNA.

102.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is a synthetic nucleic acid molecule which further comprises a target-specific nucleotide sequence.

103.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each genedigit is a DNA.

104.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each genedigit is a DNA.

105.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each genedigit is a DNA.

106.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each said molecule and each said anti-genedigit is a nucleic acid and each said molecule is noncovalently attached to an unlabeled bridging nucleic acid.

107.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is a synthetic nucleic acid molecule which further comprises a target-specific nucleotide sequence.

108.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each genedigit is a DNA.

109.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein said molecule is a nucleic acid which further comprises a target-specific nucleotide sequence.

110.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein said molecule is a nucleic acid.

111.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is a nucleic acid molecule which further comprises a target-specific nucleotide sequence.

112. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is a nucleic acid molecule which further comprises a target-specific nucleotide sequence.

113. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is noncovalently attached to a target molecule.

114. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is noncovalently attached to a target molecule.

115. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is noncovalently attached to a target molecule.

116. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is noncovalently attached to a target molecule.

117. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is noncovalently attached to a target molecule.

118. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is noncovalently attached to a target molecule.

119. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the molecule is noncovalently attached to a target molecule.

120. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein the molecule and the target molecule is each a DNA molecule and wherein said noncovalent attachment is via hybridization.

121. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein the target molecule is unlabeled.

122. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the target molecule is unlabeled.

123. (Previously presented) The diverse population of claim **Error! Reference source not found.-Error! Reference source not found.**, wherein each said genedigit and each said antigenedigit is DNA, and wherein said genedigit and said antigenedigit are attached to one another noncovalently via hybridization.

124. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein each of at least two of said genedigits comprises a repeated core element.

125. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein at least two of said genedigits have different sequences.

126. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein said plurality of said genedigits is at least four genedigits, said at least four genedigits being each attached to a respective anti-genedigit.

127. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein said plurality of said genedigits is at least five genedigits, said at least five genedigits being each attached to a respective anti-genedigit.

128. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein at least one label monomer is light-emitting.

129. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein said label monomer is fluorescent.

130. (Previously presented) The diverse population of claim **Error! Reference source not found.-Error! Reference source not found.**, wherein each of said unique labels comprises a mixture of two or more different label monomers.

131. (Previously presented) The diverse population of claim **Error! Reference source not found., Error! Reference source not found., Error! Reference source not found., Error! Reference source not found., Error! Reference source not found., Error! Reference source not found., Error! Reference source not found., Error! Reference source not found., Error! Reference source not found.,** or **Error! Reference source not found.**, wherein the target-specific nucleotide sequence in each unique label is different.

132. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein at least one label monomer is a quantum dot.

133. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein at least one anti-genedigit is a dendrimer.

134. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the dendrimer is a fork-like dendrimer.

135. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein the dendrimer is a comb-like dendrimer.

136. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein each said anti-genedigit is covalently attached to each said at least one label monomer.

137. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each said at least one label monomer is fluorescent.

138. (Previously presented) The diverse population of any one of claims **Error! Reference source not found., Error! Reference source not found. and Error!**

Reference source not found.-Error! Reference source not found., wherein each said target molecule is attached to a chip, microarray or bead.

139.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each said target molecule is attached to a chip, microarray or bead.

140.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each said target molecule is attached to a chip, microarray or bead.

141.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each said target molecule is attached to a chip, microarray or bead.

142.   (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, comprising 40 or more unique labels.

143.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, comprising 100 or more unique labels.

144.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, comprising 150 or more unique labels.

145.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, comprising 200 or more unique labels.

146.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, comprising 500 or more unique labels.

147.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, comprising 1,000 or more unique labels.

148.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, comprising 2,000 or more unique labels.

149.   (Previously presented) The diverse population of claim **Error! Reference source not found.**, comprising 5,000 or more unique labels.

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150. (Previously presented) The diverse population of claim **Error! Reference source not found.**, comprising 1×10^4 or more unique labels.

151. (Previously presented) A diverse population of labels, comprising thirty or more unique labels, wherein each of said unique labels comprises a molecule, said molecule comprising a plurality of genedigits, each genedigit being of predetermined sequence, wherein at least two of said genedigits are each attached to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer, and wherein said label monomer is a quantum dot.

152. (Previously presented) A diverse population of labels, comprising 100 or more unique labels, wherein each of said unique labels comprises a nucleic acid molecule, said nucleic acid molecule comprising (i) at least four genedigits, each genedigit being of predetermined sequence, wherein said at least four genedigits are each noncovalently hybridized to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer; and (ii) a target-specific nucleotide sequence, said target-specific nucleotide sequence being noncovalently hybridized to an unlabeled target molecule.

153. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein each said anti-genedigit is covalently attached to each said at least one label monomer.

154. (Previously presented) The diverse population of claim **Error! Reference source not found.**, wherein said at least one label monomer is fluorescent.

155. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein each said nucleic acid molecule is noncovalently attached via hybridization to an unlabeled bridging nucleic acid.

156. (Previously presented) The diverse population of one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein each said unlabeled target molecule is attached to a chip, microarray or bead.

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157. (Previously presented) A labeling kit, said kit comprising (i) in a first container, thirty or more unique molecules, each said molecule comprising a plurality of genedigits, each genedigit being of predetermined sequence, and (ii) in one or more other containers, a plurality of respective anti-genedigits, each said anti-genedigit being attached to at least one label monomer.

158. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, wherein each of at least two of said genedigits comprises a repeated core element.

159. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, wherein at least one label monomer is light-emitting.

160. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, wherein said label monomer is fluorescent.

161. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, wherein at least one label monomer is a quantum dot.

162. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, wherein at least one anti-genedigit is a dendrimer.

163. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, wherein the dendrimer is a fork-like dendrimer.

164. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, wherein the dendrimer is a comb-like dendrimer.

165. (Previously presented) The labeling kit of any one of claims **Error! Reference source not found.-Error! Reference source not found.**, wherein each molecule and each anti-genedigit is a nucleic acid.

166. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, wherein each molecule and each anti-genedigit is a DNA.

167. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, wherein each molecule further comprises a target-specific nucleotide sequence.

168. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, wherein each molecule is noncovalently attached to an unlabeled bridging nucleic acid.

169. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, comprising 40 or more unique molecules.

170. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, comprising 100 or more unique molecules.

171. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, comprising 150 or more unique molecules.

172. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, comprising 200 or more unique molecules.

173. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, comprising 500 or more unique molecules.

174. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, comprising 1,000 or more unique molecules.

175. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, comprising 2,000 or more unique molecules.

176. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, comprising 5,000 or more unique molecules.

177. (Previously presented) The labeling kit of claim **Error! Reference source not found.**, comprising 1×10^4 or more unique molecules.

178. (Previously presented) The diverse population of any one of claims **Error! Reference source not found.-Error! Reference source not found., Error! Reference**

source not found., and **Error! Reference source not found.-Error! Reference source not found.**, wherein the labels are spread on a two-dimensional surface.